

## Comparison between Quadrantectomy and Modified Radical Mastectomy in Early Breast Cancer

General Surgery

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### ABSTRACT

**Background:** Breast cancer (BC) has been the most frequent cancer among women worldwide, and it is the leading cause of cancer-related death. Nowadays, numerous surgical treatments are extensively employed in the management of BC, including full surgical resection of the breast (mastectomy) and breast conserving operations (quadrantectomy), which may or may not be accompanied by radiation.

**Aim of the work:** To analyze the optimal surgical management for early breast cancer through the comparison between quadrantectomy and modified radical mastectomy.

**Patients and methods:** A total of 60 women suffering from early breast cancer were diagnosed using precise criteria and were gathered from January 2021 to January 2022. In this study, we classified 2 groups: Group A: 30 patients prepared for quadrantectomy and Group B: 30 patients prepared for modified radical mastectomy.

**Results:** there is no significant difference between the two groups regarding age and BMI, tumor size and site, mass site in the breast, histopathology findings, grade and stage, complications and recurrence. When compared to the quadrantectomy group, the mastectomy group had significantly higher surgical time, loss of blood, and hospital stay. Disease free survival after 12 months in group A was 82.5% and in group B it was 94.2%, with a log rank test of 0.861.

**Conclusion:** When compared to modified radical mastectomy, quadrantectomy was more efficacious in the management of early-stage breast cancer, involving less surgery time and intraoperative blood and a reduced hospital length of stay.

**Keywords:** Breast Cancer; Early Stage; Optimum Operation; Quadrantectomy; Radical Mastectomy.

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**Authorship:** All authors have a substantial contribution to the article.

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### INTRODUCTION

Breast cancer represents the most frequent type of cancer worldwide and is the major cause of cancer mortality in women. In the year 2021, nearly 2 million new instances of breast cancer will be diagnosed.<sup>1</sup> In the United States, breast cancer represents the most frequent cancer among women, with ever-changing treatment guidelines. Breast cancer treatment often involves surgery, including breast conserving surgery or mastectomy.<sup>1</sup>

As reported by the US Centers for Disease Control (CDC), breast cancer has been one of the most common causes of mortality among women worldwide. Estimates suggest that over one million women are diagnosed with breast cancer each year and that over 400,000 deaths have been attributed to this disease, which accounts for 14% of all breast cancer deaths in women. The unfavorable negative impacts of breast cancer therapy are one of the most

motivating factors in the search for alternative methods.<sup>2</sup>

The purpose of breast cancer management is to maintain one's quality of life while also extending one's average lifespan. The main forms of cancer treatment in men are surgery, radiotherapy and chemotherapy.<sup>3</sup> Medicines may frequently offer temporary symptomatic alleviation, prolong life, and sometimes treat illness. Targeted treatments, hormone therapy, radiotherapy, and surgery are all options for breast cancer treatment currently. Types of breast cancer surgery vary, depending on how much tissue is removed along with the tumor. It is based on the characteristics of the cancer, its spread, and the specific feelings of the patient.<sup>4</sup>

A lumpectomy, also known as a partial mastectomy, is a surgical technique that involves removing a portion of the breast containing a malignant tumor, as well as some healthy tissue and lymph nodes, while

leaving most of the breast intact, as per the American Cancer Society.<sup>5</sup> Early diagnosis and comprehensive treatment of CS are important for a good prognosis. However, the aesthetics of the breasts are seriously affected, although the MRM retains the large and small pectoral muscles.<sup>6</sup>

Many types of surgery are currently being performed in British Columbia, including: B. Surgical excision of the entire breast (mastectomy) as well as breast-conserving procedures (quadrantectomy), accompanied by radiotherapy or other means. The involves the removal of 2 x 3 cm of healthy tissues surrounding the tumor, as well as sufficient overlying skin and underlying fascia.<sup>7</sup>

Breast reconstruction is usually performed during or following an operation to reduce the patient's psychological stress. Surgical techniques are usually associated with changes in appearance and surgical scars on the chest. Common conditions that may occur after BC surgery/chemotherapy include shoulder weakness, syndrome of post-mastectomy, axillary chordoma, chemotherapy-induced peripheral neuropathy, lymphedema, and postural disturbances.<sup>8</sup>

Mastectomy is the most effective way to treat a case of already metastatic breast cancer where lumpectomy was inconclusive. Reports support that breast-conserving therapy is an acceptable treatment modality, and breast-conserving therapy has been recommended as the therapeutic choice for stage I and II breast cancer.<sup>8</sup> Quadrantectomy with axillary node dissection associated with radiotherapy is the most commonly used method of conservative breast treatment.<sup>9</sup>

The study aimed to reach optimal surgical management for early breast cancer through the comparison between quadrantectomy and modified radical mastectomy.

## PATIENTS AND METHODS

### Study Population

After receiving approval from the research and ethical committee, this study was carried out in the general surgery departments of Al-Azhar University Hospitals and Al-Ahrar Teaching Hospital. The study runs from January 2021 to January 2022. Population of the study included Woman presented by early breast cancer aged from 20 to 60 Years. All patients participate in this study was given an informed written consent.

### Study Design and Study Interventions

The sample size was 60 patients, divided into 2 equal groups. The study included patients with specific inclusion criteria: early breast cancer in female patients aged 20 to 60 years (stages I and II). While, the excluded criteria: Patients aged less than 20 years or more than 60 years. Advanced breast cancer stages

III and IV. Recurrent breast cancer. Small breasts. Sixty patients are subdivided into 2 groups: Group A: 30 patients, prepared for quadrantectomy and Group B: 30 patients, prepared for modified radical mastectomy. The following will be done to each patient who participates in the study: A complete history is taken, and a clinical examination is performed, which includes a physical examination and specific investigations: Noninvasive Laboratory Exam: Complete Blood Count (CBC), Blood Grouping, Prothrombin time and International Normalized Ratio (INR), kidney and liver functions, blood glucose level, viral markers (HCV, HBV, and tumor markers). Radiological Examination: Breast ultrasound and mammography, MRI in selected cases and Metastatic work up. Invasive investigation: cutting needle biopsy, fine needle aspiration cytology, incisional or excisional biopsy, and hormonal receptors. Pre-operative preparation and informed consent, General anesthesia, Supine position, Group A quadrantectomy or wide local excision with axillary clearance and Group B modified radical mastectomy with axillary clearance. Closure with drain. Post-operative follows up: Post-operative complications as bleeding or wound infection, Duration of hospital stay and Histopathological Study to correlation. Follow-up: Mammograms at 6 and 12 months, Magnetic resonance imaging (MRI) 6 months after surgery and Tumor marker (CEA- CA15-3- CA27.29- CA 125) every 3 months.

### Statistical Analysis

SPSS 22.0 for Windows (SPSS Inc., Chicago, IL, USA) and MedCalc 13 for Windows (MedCalc Software bvba, Ostend, Belgium) were used to collect, tabulate, and statistically analyze all the data. The Shapiro-Walk test has been performed to determine if the data has a normal distribution. Frequencies and relative percentages have been employed to represent qualitative data. The difference between qualitative variables has been calculated using the Chi square test ( $\chi^2$ ) as well as Fisher exact as specified. For parametric data, mean  $\pm$  SD (standard deviation) has been employed, and for non-parametric data, median and range have been used. For parametric as well as non-parametric parameters, the Independent T test and Mann Whitney test have been employed to determine the difference across quantitative variables in two groups. The Kaplan-Meier approach was employed for estimating event-free survival, and the log rank test was performed to compare survival curves (P values of  $\leq 0.05$  levels were deemed significant). All statistical comparisons have been two-tailed, with a P-value of  $< 0.001$  indicating a highly significant difference,  $P \leq 0.05$  indicating a significant difference, and  $P > 0.05$  indicating a non-significant difference.

## RESULTS

### Comparison between Age and BMI

After analysis, there were no significant differences in age and BMI among the two groups included in the study, with P values of 0.810 and 0.357, respectively (Table 1).

	Quadrantectomy (N=30)	Mastectomy (N=30)	t	p
Age (years)			.241	.810
Mean $\pm$ SD	48.8 $\pm$ 7.74	49.27 $\pm$ 7.35		
Range	34 – 55	36 – 60		
BMI (kg/m <sup>2</sup> )			.929	.357
Mean $\pm$ SD	27.41 $\pm$ 2.36	28.13 $\pm$ 3.53		
Range	24 – 29	23 – 30		

**Table 1:** Demographic data between the two studied groups

Comparison between tumor size and site

Our findings revealed that tumor size among Group A and Group B were significantly no differences between both groups with P value 0.237. Tumor Site group A the right 17 (56.7%) and the left 13 (43.3%), while in Group B 14 (46.7%) and 16 (53.3%) with no significant differences P value 0.438 (Table 2).

	Quadrantectomy (N=30)	Mastectomy (N=30)	t / $\chi^2$	p
Size (cm)			1.19	.237
Mean $\pm$ SD	9.49 $\pm$ 3.27	8.65 $\pm$ 2.03		
Range	4.3 – 16.2	4 – 14.5		
Site			.601	.438
Right	17 (56.7%)	14 (46.7%)		
Left	13 (43.3%)	16 (53.3%)		

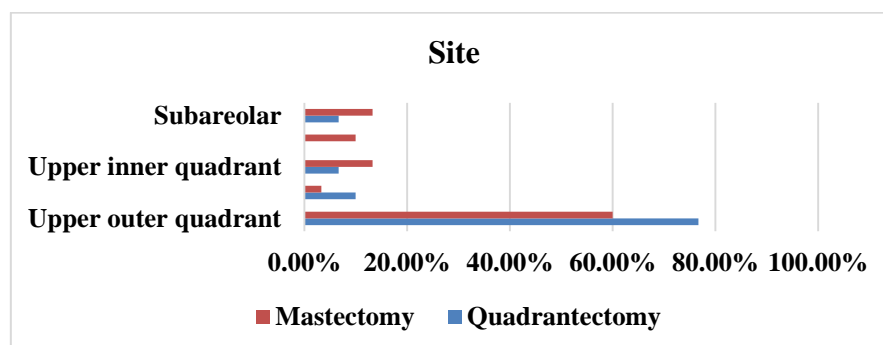
**Table 2:** Breast tumor size and site between both groups

Distribution among Quadrantectomy and Mastectomy

Our findings revealed that the distribution between quadrantectomy and mastectomy through upper and lower outer, upper and lower inner quadrant and subareolar with no significant differences P value 0.203 (Table 3 and Figure 1).

	Quadrantectomy (N=30)	Mastectomy (N=30)	$\chi^2$	p
Upper outer quadrant	23 (76.7%)	18 (60%)	5.94	.203
Lower outer quadrant	3 (10%)	1 (3.3%)		
Upper inner quadrant	2 (6.7%)	4 (13.3%)		
Lower inner quadrant	0	3 (10%)		
Subareolar	2 (6.7%)	4 (13.3%)		

**Table 3:** Site distribution between the two studied groups



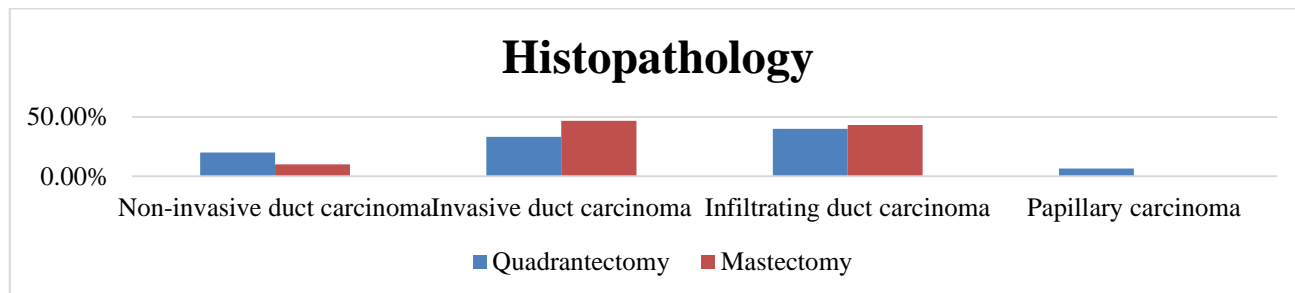
**Fig. 1 :** Site distribution between operative techniques

Histopathological Findings among Quadrantectomy and Mastectomy

All patient subjected to histopathological findings; through invasive and non-invasive, infiltrating duct carcinoma and papillary carcinoma with no significant difference P value (0.295) (Table 4 and Figure 2).

	Quadrantectomy (N=30)	Mastectomy (N=30)	$\chi^2$	P
Non-invasive duct carcinoma	6 (20%)	3 (10%)	3.71	.295
Invasive duct carcinoma	10 (33.3%)	14 (46.7%)		
Infiltrating duct carcinoma	12 (40%)	13 (43.3%)		
Papillary carcinoma	2 (6.7%)	0		

**Table 4:** Histopathology findings between the two studied groups



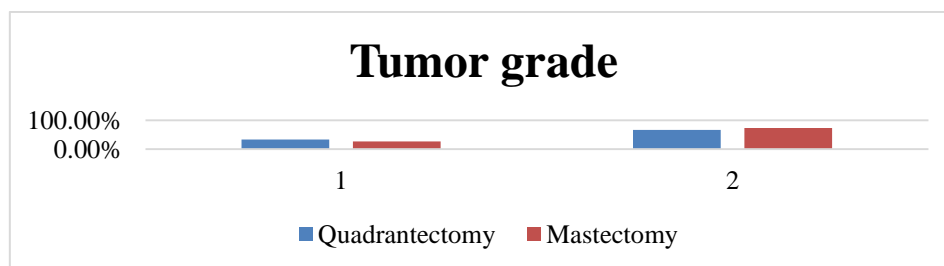
**Fig. 2 :** Histopathology findings Site distribution between the mastectomy and quadrantectomy techniques

**Tumor Grade and N stage**

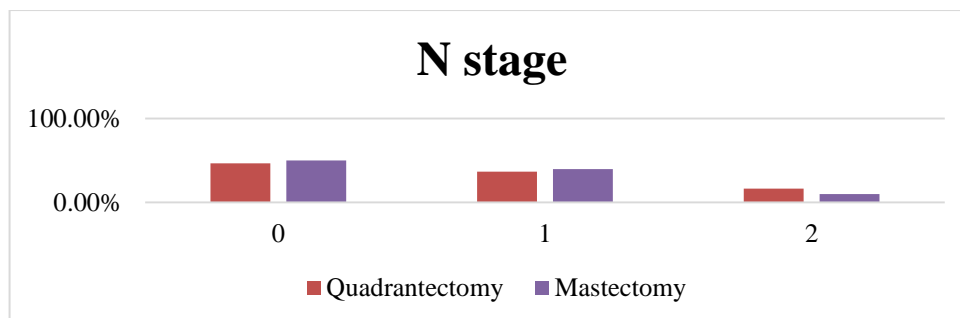
Our study findings observed that; tumor grade compared grade 1 and 2 among both groups with no significant differences P value (0.573). N Stage compared stage 0, 1 and 2 among both groups with no significant difference P value (0.749) (Table 5, Figure 3 and Figure 4).

	Quadrantectomy (N=30)	Mastectomy (N=30)	$\chi^2$	P
<b>Tumor grade</b>			.318	.573
1	10 (33.3%)	8 (26.7%)		
2	20 (66.7%)	22 (73.3%)		
<b>N stage</b>			.578	.749
0	14 (46.7%)	15 (50%)		
1	11 (36.7%)	12 (40%)		
2	5 (16.7%)	3 (10%)		

**Table 5:** Tumor grade and stage of the two studied groups



**Fig. 3:** Tumor grads between the mastectomy and quadrantectomy techniques



**Figure (4) – N stage percentage between quadrantectomy and mastectomy techniques**

Comparison between Operative time, Blood loss and Hospital stay

When comparing both groups; significant differences were observed in operative time (minutes), loss of blood (ml) and hospital stay (day) with a P value of (0.000) (Table 6).

	Quadrantectomy (N=30)	Mastectomy (N=30)	Test	p
Operative time (min) Mean ±SD	53.81 ± 12.76	94.13 ± 14.35	11.5	.000
Blood loss (ml) Mean ±SD	40.71 ± 12.5	81.57 ± 14.7	11.6	.000
Hospital stay (day) Mean ±SD	11.92 ± 2.39	14.79 ± 3.41	3.77	.000

**Table 6:** Operative data between both groups

Comparison between Postoperative complications

Our results observed that, site infection represents the highest percentages among both groups; group A 4 (13.3 %) and Group B (6.7%) non significance with p value (0.389). While, Seroma represents 3 (10 %) in group A and 1 (3.3%) in Group B non significant with P value (0.302). hematoma were 1 (3.3% ) in group A and 2 (6.7%) in Group B non significance with P value (0.554) (Table 7).

	Quadrantectomy (N=30)	Mastectomy (N=30)	x <sup>2</sup>	p
Seroma	3 (10%)	1 (3.3%)	1.07	.302
Site infection	4 (13.3%)	2 (6.7%)	.741	.389
Hematoma	1 (3.3%)	2 (6.7%)	.351	.554

**Table 7:** Postoperative complications between both groups

Recurrence among Quadrantectomy and Mastectomy

When comparing both group for the determination of recurrence after the surgical management among both operative techniques; there were non significant differences detected with p value (0.554) (Table 8).

	Quadrantectomy (N=30)	Mastectomy (N=30)	x <sup>2</sup>	p
Recurrence	2 (6.7%)	1 (3.3%)	.351	.554
None	28 (93.3%)	29 (96.7%)		

Table (8): Recurrence between both groups

Disease Free Survival – Survival Analysis

On the basis of patient; the mean disease free survival were 12 months for quadrantectomy and mastectomy with survival rate (94.5%) and (82.5%). Patients who treated with quadrantectomy has significantly difference better than who treated with mastectomy RT (0.861) on survival analysis; Mean Group A (5.902) and Group B (3.724), Standard deviation (2.132) group A and (1.145) group B, 95% confidence interval [CI] 3.599 - 7.619 group A, 2.833 - 4.615 Group B with cum survival (0.100) for group A.

	Mean	SD	95% CI	Log Rank test	Survival at 12-months
Group A	5.902	2.132	3.599 - 7.619	0.861	94.5%
Group B	3.724	1.145	2.833 - 4.615		82.2%

**Table 9:** Recurrence-Free Survival

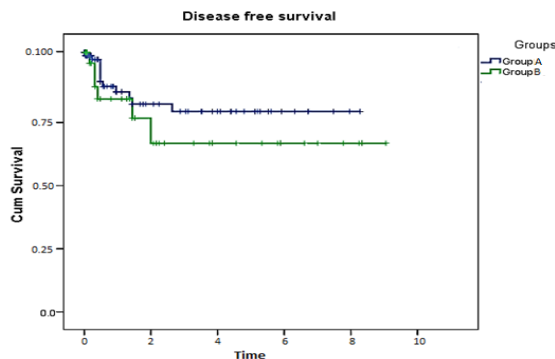


Figure (5) - Breast cancer patients' Kaplan-Meier survival curve depicting recurrence-free survival.

## DISCUSSION

Breast cancer (BC) represents the most frequent cancer in women and one of the main reasons for malignancy mortality globally. Possible risk factors for BC include high BMI, old age, family history, long periods, use of oral contraceptives, and exposure to radiation.<sup>10</sup>

Many studies focus on the diagnosis and management of primary cancers. In order to achieve a longer lifespan, it facilitates the treatment of breast cancer. For early-stage breast cancer, therapy with mastectomy or quadrantectomy is routinely recommended for local surveillance and prevention of later stages. However; due to lack of early detection of breast cancer focuses on treatment through surgery.<sup>11</sup>

This prospective study was conducted from January 2021 to January 2022 at Al-Azhar University Hospital in Cairo. This study involved 60 women between the ages of 20 and 60 with early breast cancer. Two groups of patients were created: Group A was composed of 30 patients who had been prepared for quadrantectomy; Group B: 30 patients prepared for modified radical mastectomy were included.

Several reasons can explain this improvement in both mastectomy and quadrantectomy. Mastectomy has a low incidence in women with early breast cancer. According to the pathological examination, all breast tissue is applied. However; quarterectomy has helped a large percentage of early breast cancer cases; they have the ability to identify primary precancerous lesions, and pathological examination plays a significant role in determining a breast lesion with an understanding of the prognosis.<sup>12</sup>

According to our results, group A treated with quadrantectomy showed no progression of breast cancer compared to group B treated with mastectomy. A patient treated with a quadrantectomy should not develop an absent lesion breast in a larger tumor; However; in some patients undergoing mastectomy, missing breast lesion is expected to progress to a higher stage T tumor.

In terms of demographics between the two groups studied, With respect to age and BMI, the present results showed no significant differences across the two groups. The current study was consistent with the study that aimed to compare the outcomes of mastectomy and quadrantectomy in breast cancer treatment, and the study included 59 cases.<sup>13</sup> In regards to age and BMI, there have been no significant differences across the two groups.

The current study was supported by a previous study that was aimed at comparing the impacts of breast-conserving operations and modified radical mastectomy on patients with early-stage breast cancer. The study included 30 patients with early breast cancer who experienced conservative surgical procedures and 30 patients whose roots were damaged.<sup>14</sup>

Regarding the main characteristics of breast cancer in the groups studied, we found no significant differences across the two groups in regards to tumor size, location, and breast mass location. A previous study also reported that tumor location had an impact on the choice of breast-conserving surgery as the surgical procedure, with significant statistical correlation.<sup>15</sup> In regards to histopathological findings, we discovered no significant differences across the two groups. In respect of rank and level, there have been no significant differences across the two groups.<sup>16</sup>

So far as we know, previous research found no significant differences in disease type and classification across the two groups. According to a previous study, in regards to clinical stage N and pathological stage N, there have been no significant differences across research groups, while there have been significant differences with regards to histology.<sup>17</sup>

Regarding the surgical data between the two groups, we found that the operative duration, loss of blood, and hospital duration of stay were significantly longer in the mastectomy group than in the quadrantectomy group. As far as we know; A previous study reported that the breast-conservation group had a statistically significant difference ( $P < 0.05$ ) in operative duration, intraoperative loss of blood, and hospital stay compared to the modified radical mastectomy group.<sup>18</sup>

Regarding postoperative complications, the current research found no statistically significant differences across the two groups.<sup>19</sup> In regards to relapse rate, the current research found no significant differences across the two groups.<sup>20</sup> In addition, a previous study found that 3 recurrences and 13 distant metastases were observed in the breast preservation group, with a recurrence rate of 2.80% and a metastasis rate of 12.15%, respectively.<sup>21</sup> According to the Kaplan-Meier survival curve, disease-free survival at 12 months was 94.5% in the quadrantectomy group and 82.2% in the mastectomy group.<sup>22</sup>

## CONCLUSION

Quadrantectomy is linked to a better survival rate in early breast cancer patients compared with mastectomy. Quadrantectomy is considered to be the optimal management for early breast cancer. Further randomized controlled studies with greater sample numbers are required to assess both surgeries in more detail.

Conflict of interest : none

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